

~objective~.

Solve problems involving scale drawings

YOU WILL  
NEED A  
TEXTBOOK  
& RULER

# Scale Drawings

# Vocabulary

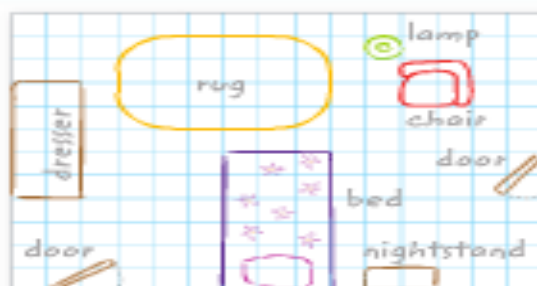
## Use a Scale Drawing or a Scale Model

**Scale drawings** and **scale models** are used to represent objects that are too large or too small to be drawn or built at actual size. The **scale** gives the ratio that compares the measurements of the drawing or model to the measurements of the real object. The measurements on a drawing or model are proportional to the measurements on the actual object.



# Real-World Link

**Room Model** Architects make detailed drawings of rooms and buildings. Conner made a drawing of a bedroom. Follow the steps below to make a model of a room of your choosing.



## Step 1

Measure the length of three objects in the room. Record each length to the nearest  $\frac{1}{2}$  foot in the table below.

Object	Length (ft)	Length (units)
Dresser	10	5
Bed	12	6
Rug	12	6



## Step 2

Let 1 unit represent 2 feet. So, 4 units = 8 feet. Convert all your measurements to units. Record these values.

## Step 3

On grid paper, make a drawing of your room like the one shown.



# EXAMPLE

## Example

- 1. What is the actual distance between Hagerstown and Annapolis?**

### Step 1

Use a centimeter ruler to find the map distance between the two cities. The map distance is about 4 centimeters.



### Step 2

Write and solve a proportion using the scale. Let  $d$  represent the actual distance between the cities.

**Scale** = **Length**

map → actual →      ← map ← actual

## Cross products

## Simplify.

Scale

A map scale can be written in different ways, including the following:

$1 \text{ cm} = 20 \text{ mi}$

$1 \text{ cm} : 20 \text{ mi}$

$\frac{1 \text{ cm}}{20 \text{ mi}}$

# PRACTICE PROBLEM # 1

**ot It?** Do this problem to find out.

- a. On the map of Arkansas shown, find the actual distance between Clarksville and Little Rock. Use a ruler to measure.



**ABOUT 80 MILES**

# PRACTICE PROBLEM # 2

On a map, the distance from Akron to Cleveland measures 2 centimeters. What is the actual distance if the scale of the map shows that 1 centimeter is equal to 30 kilometers?

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# EXAMPLE

## Example

2. A graphic artist is creating an advertisement for this cell phone. If she uses a scale of 5 inches = 1 inch, what is the length of the cell phone on the advertisement?

Write a proportion using the scale.  
Let  $a$  represent the length of the advertisement cell phone.

advertisement  $\rightarrow$   
actual  $\rightarrow$

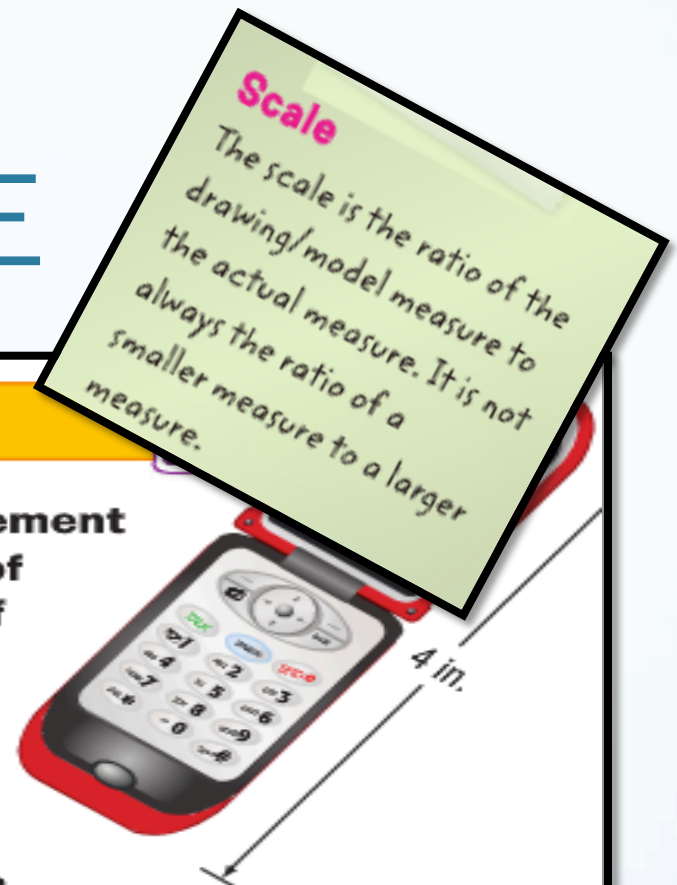
Scale      Length

=

$\leftarrow$  advertisement  
 $\leftarrow$  actual

Cross products

Simplify.



# PRACTICE PROBLEM # 3

**Got It?** Do this problem to find out.

- b. A scooter is  $3\frac{1}{2}$  feet long. Find the length of a scale model of the scooter if the scale is 1 inch =  $\frac{3}{4}$  feet.

**4 2/3 In.**



# PRACTICE PROBLEM # 4

An engineer makes a model of a bridge using a scale of 1 inch = 3 yards. The length of the actual bridge is 50 yards. What is the length of the model?

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# EXAMPLE

## Find a Scale Factor

A scale written as a ratio without units in simplest form is called the **scale factor**.

### Example



- 3. Find the scale factor of a model sailboat if the scale is 1 inch = 6 feet.**

$$\begin{aligned}\frac{1 \text{ inch}}{6 \text{ feet}} &= \frac{1 \cancel{\text{ inch}}}{72 \cancel{\text{ inches}}} \\ &= \frac{1}{72}\end{aligned}$$

Convert 6 feet to inches.

Divide out the common units.

The scale factor is  $\frac{1}{72}$ .

# PRACTICE PROBLEM # 5

**Got It?** Do this problem to find out.

- c. What is the scale factor of a model car if the scale is  
 $1 \text{ inch} = 2 \text{ feet}$ ?

**1/24**

# PRACTICE PROBLEM # 6

Julie is constructing a scale model of her room. The rectangular room is  $10\frac{1}{4}$  inches by 8 inches. If 1 inch represents 2 feet of the actual room, what is the scale factor and the actual area of the room?

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# EXAMPLE



## Example



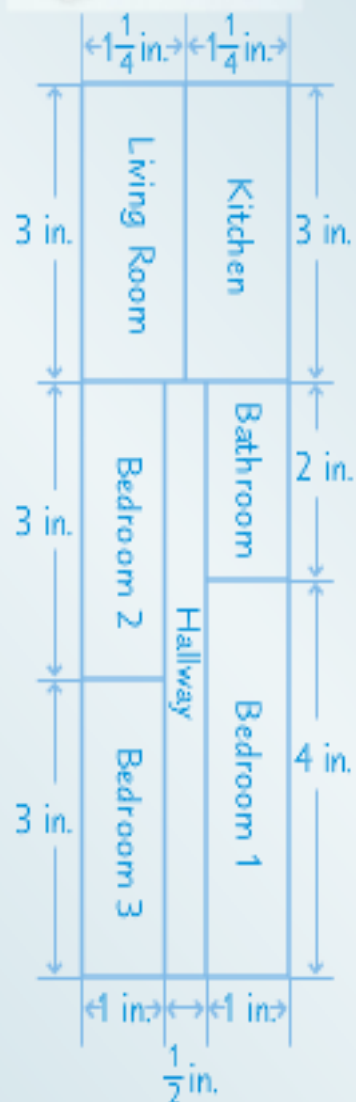
4. A floor plan for a home is shown at the left where  $\frac{1}{2}$  inch represents 3 feet of the actual home. What is the actual area of bedroom 1?

Length of Bedroom 1.

$$\frac{\frac{1}{2} \text{ in.}}{3 \text{ ft}} = \frac{4 \text{ in.}}{w} \quad \begin{array}{l} \leftarrow \text{floor plan} \\ \leftarrow \text{actual} \end{array}$$

Width of Bedroom 1.

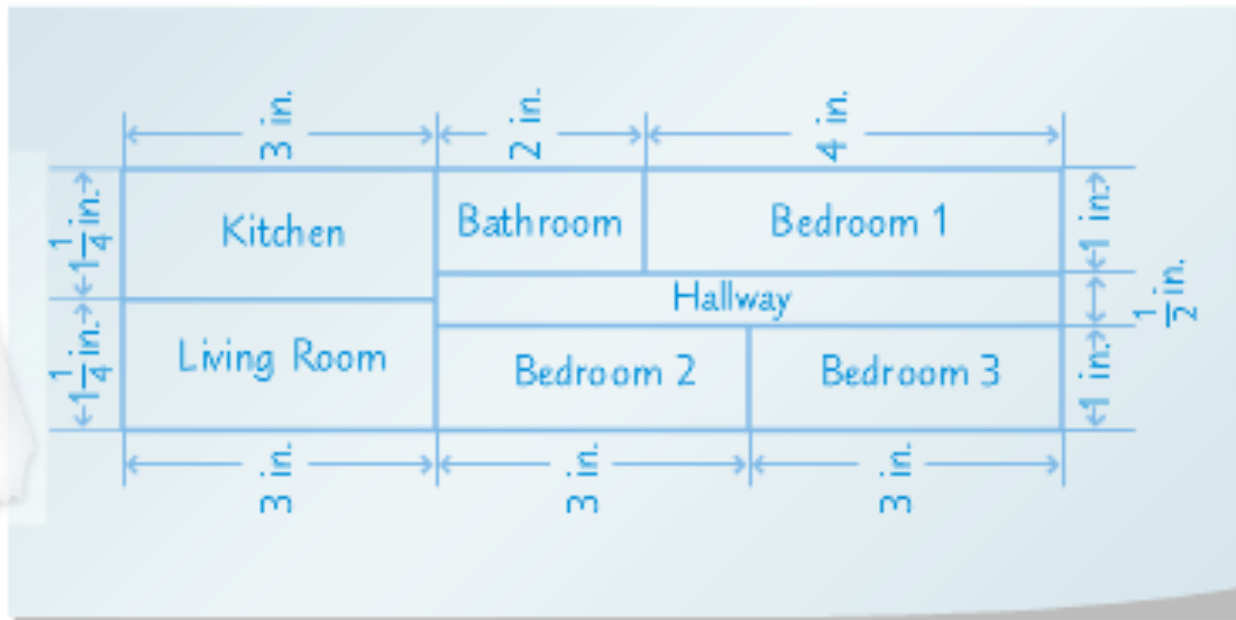
$$\frac{\frac{1}{2} \text{ in.}}{3 \text{ ft}} = \frac{1 \text{ in.}}{x} \quad \begin{array}{l} \leftarrow \text{floor plan} \\ \leftarrow \text{actual} \end{array}$$



# PRACTICE PROBLEM # 7

**Got It?** Do this problem to find out.

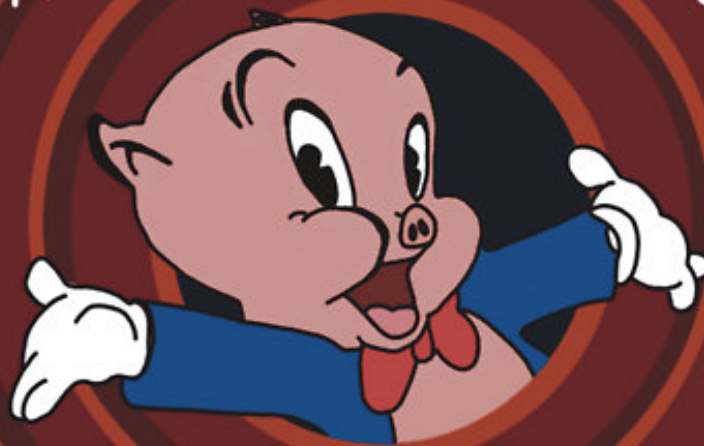
d. What is the actual area of bedroom 3?



**108ft<sup>2</sup>**



*That's all Folks!*



kalilak